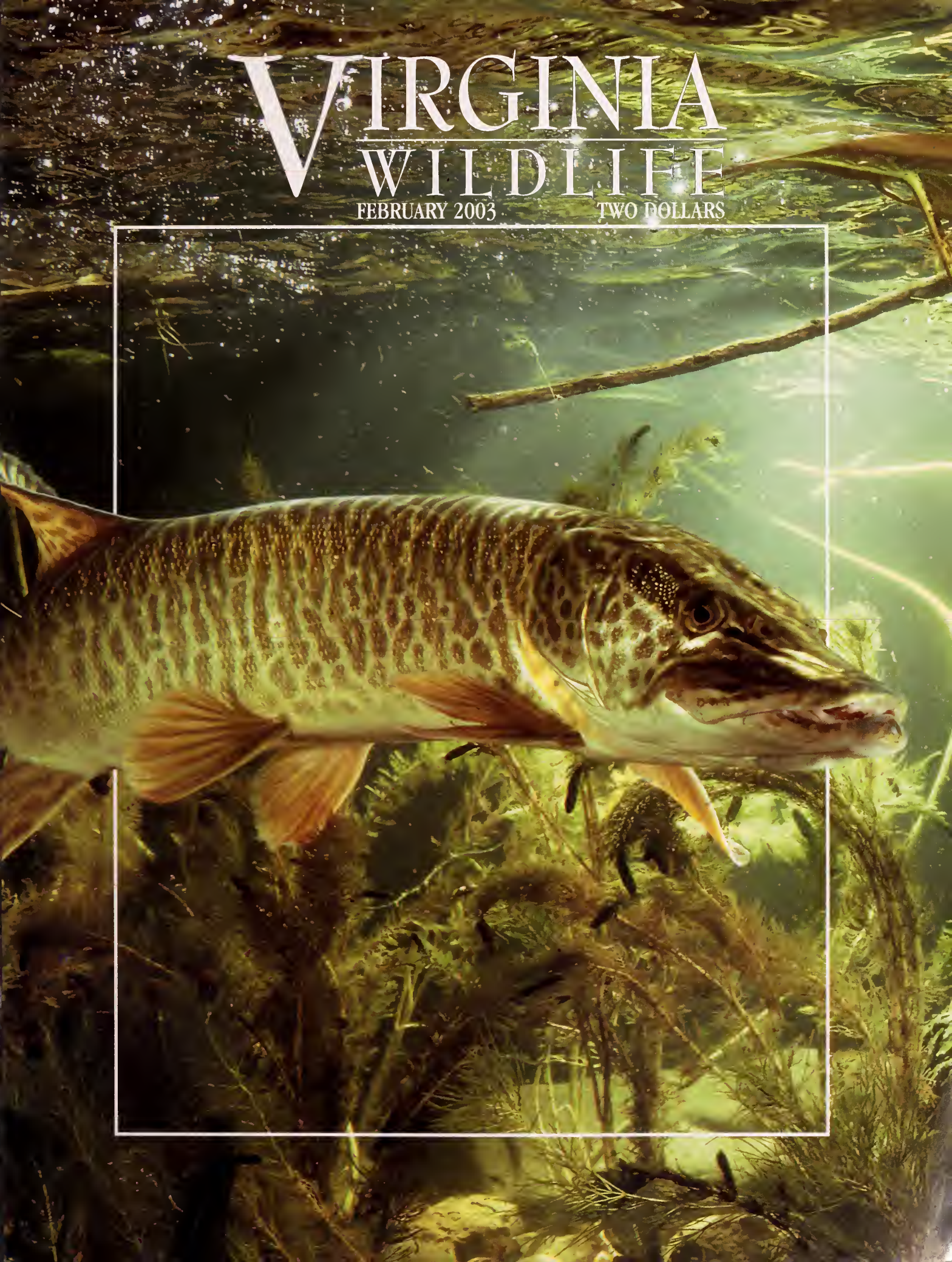
VIRGINIA WILDLIFE

FEBRUARY 2003 TWO DOLLARS



Director's Column

William L. Woodfin, Jr

If we look back to June 17, 1916, when the Virginia Department of Game and Inland Fisheries (VDGIF) was created, we see in that act, hunters and anglers setting in motion a tradition of conserving and protecting wildlife and natural resources in Virginia. From that time forward they have put their money where their mouths are when it comes to funding conservation efforts. For more than 86 years the financial contributions made by hunters and anglers on behalf of the Commonwealth, have been remarkable.

Recently, the Congressional Sportsmen's Foundation and the National Shooting Sports Foundation reported that spending on outdoor-related activities by people who purchase hunting and fishing licenses each year, is big business. How big a business you ask? According to their report, based on the U.S. Fish & Wildlife Service's national survey of sportsmen, spending by hunters and anglers nationally would create a business that would rank No. 11 on the Fortune 500 list. In Virginia alone, hunting and fishing expenditures exceed $1.1 billion.

Add in the more recent contributors to conservation efforts, wildlife watchers, and the total expenditures by participants in hunting, fishing, and wildlife watching in Virginia jumps to $1.8 billion. In Virginia alone, this "business" supports more jobs than some of the Commonwealth's largest employers and annually generates millions in state sales, fuel, and income taxes.

Melinda Gable, Executive Director of the Congressional Sportsmen's Foundation said it best, "The economic impact that sportsmen have on the state's economies should be a wake-up call to state governments to welcome and encourage hunting and fishing in their states." She added, "It is a fairly simple equation—hunters and anglers mean jobs in states and local economies that have made the effort to maintain their hunting and fishing opportunities."

If you want to make an impact on the future of Virginia, not only economically, but also environmentally, I urge you, as the year gets underway, to purchase hunting and fishing licenses, if not for yourself, then for a family member or friend. A hunting or fishing license is more than just a permit to hunt and fish. That license is an investment that makes you a "stockholder" in the business of conservation.

Mission Statement

To manage Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth; to provide opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation; to promote safety for persons and property in connection with boating, hunting and fishing.

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Virginia Wildlife (ISSN 0042 6792) is publishe monthly by the Virginia Department of Game an Inland Fisheries. Send all subscription orders an address changes to *Virginia Wildlife*, P. O. Box 7477 Red Oak, Iowa 51591-0477. Address all other com munications concerning this publication t *Virginia Wildlife*, P.O. Box 11104, 4010 West Broa Street, Richmond, Virginia 23230-1104. Sub scription rate is $12.95 for one year, $23.95 for tw years; $2.00 per each back issue, subject to avail ability. Out-of-country rates are the same but mus be paid in U.S. funds. **To subscribe, call toll-fre (800) 710-9369.** Postmaster: Please send all addres changes to *Virginia Wildlife*, P.O. Box 7477, Re Oak, Iowa 51591-0477. Postage for periodical paid at Richmond, Virginia and additional entr offices.

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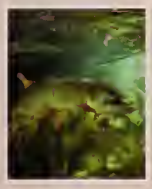
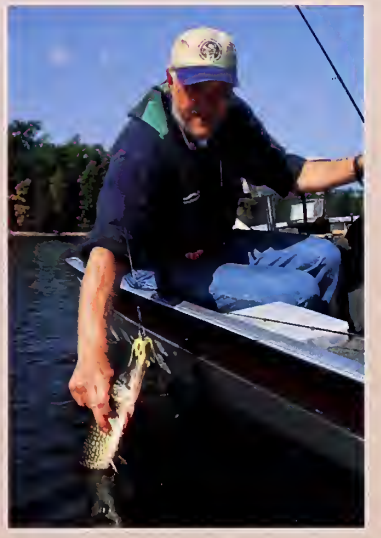
VIRGINIA WILDLIFE

page 4

page 27



About the cover: Muskellunge (*Esox masquinongy*) is one of the four pike species found in Virginia. All pike are voracious feeders and will spend much of their time lurking among aquatic vegetation waiting to ambush prey. Photo ©Bill Lindner Photography.



page 10

Features

4 **SSSSnakes Need Protection Too** by Mukhtar Farooqi
Each year hundreds of snakes are needlessly killed based on unfounded fears and stereotyping. Isn't it time to gain a better appreciation of these fascinating creatures?

10 **Fishing for Virginia's Pike Family** by Marc McGlade
Often referred to as "freshwater barracudas," northern pike, muskellunge, and chain and redfin pickerel can offer the angler a real challenge.

16 **Habitat on Public and Private Lands** by Carol A. Heiser
Wild in the Woods looks at the challenging job of managing Virginia's fields and forests.

22 **A Living Relic of the Triassic Period** by Dean Fowler
Looking for a freshwater fish with some serious spunk? A furious fighter that will make any angler bow down to its relentless power? Then how about baiting up for bowfin.

27 **First Cast** by Marcia Woolman
Trout Unlimited is learning the importance of catching the hearts and minds of young people and teaching them about protecting wild fish and their habitat.

February Journal

30 Journal
31 On The Water
GPS
32 Recipes
Winter Fish Dinner
33 Naturally Wild
Carolina Chickadee
34 Backyard Wild
Grow a Meadow Instead of a Lawn

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Dedicated to the Conservation of Virginia's Wildlife and Natural Resources

VOLUME 64 NUMBER 2

SSSSSnakes Need Protecti

Ratsnake©Lynda Richardson

by Mukhtar Farooqi

If there were a vote to select a group of animals that command the least appreciation and at the same time induce a certain element of fear, the snake family would most probably be on the top of most peoples' list. More often than not, snakes have been cast as cunning, sly, and merciless. You don't need to look too hard to find references in mythology (e.g., Medusa), various works of literature (e.g., Aesop's fables), and in the vernacular (e.g., "snake in the grass") where they are invariably seen in a bad light. There are so many negative stereotypes and apparently so few good role models that you could forgive some young snakes for slithering off the straight and narrow.

Fortunately, it's not all gloom and doom for the snake family because not all people react to them in the same way. To some extent the prevailing religion or culture to which you have been exposed may influence your perspective on snakes. According to the Bible "...the serpent was more crafty than any of the wild animals the Lord God had made." If it wasn't for that serpent we might never have had the original sin. Buddhists believe that when Siddhartha Gautama (Buddha) was deep in meditation during his quest for enlightenment, a cobra shielded him from the sun by using its open hood as a screen. The spots on the hood of the spectacled cobra are said to be the finger marks of Buddha, who blessed the snake for its good deed. The African rock python is worshipped in some regions and hunted for food in other regions. At one time, it was quite common for giant snakes to be hunted for their skins, which make fine leather. In parts of Asia some liquor companies raise snakes to put them into bottles of alcoholic beverages and this is presumably what gives the drink its "bite"! Snakes have often been used as assassins and even to commit suicide. For example, Cleopatra supposedly used an Egyptian cobra (asp) for the latter purpose. The Chinese calendar holds a prominent position for the snake; in fact 2001 was the year of the snake.

Ratsnake ©Lynda Richardson

Snakes are reptiles that belong to the suborder *Serpentes*. This group is characteristically cold blooded, i.e. they need the sun's energy to elevate their body temperature to a working range. Generally believed to have evolved from burrowing lizards, they first appeared in the fossil records in the upper Cretaceous period some 130 million years ago. Like it or not, there are over 2,600 species of snakes in the world ranging in size from 5 inches (blind snake) to over

tion Too

Is your lack of knowledge and unfounded fear helping to "shed" an unkind opinion of Virginia's Serpentes?

30 feet (reticulated python, anaconda). Some snakes give birth to their young while others lay eggs. Of the species in Virginia, 16 lay eggs and 14 produce live offspring. As they age, snakes shed their skin regularly, at least once, but sometimes as often as three times per year depending on circumstances. Life expectancy varies by species, but the maximum life span of wild snakes is estimated to be in the region of 25 years (timber rattlesnake). Snakes held in captivity do not face the same risks as their wild counterparts and consequently can live longer. The maximum recorded age for any snake is 47 years for a ballpython kept at the Philadelphia Zoo.

Canebrake ©Patrick M. Collins

Left: A newly born ratsnake *(Elaphe obsoleta)* peers from its egg. Ratsnakes are excellent climbers (above) and are found in trees and old barns. Their food source consists of small rodents, birds, and eggs. Right: The state endangered canebrake rattlesnake *(Crotalus horridus)* is the southeastern race of the timber rattlesnake. It is only found in a very small area east of the Dismal Swamp.

The most obvious physical feature of snakes is that they have no legs, although some species of pythons have what appear to be traces of hind legs (spurs) in front of the tail. Their skeleton includes hips, which other snakes lack. Most species of snakes get about by wriggling their body from side to side in S-shaped waves that start from the front of the body and move to the rear. This is the classic "serpentine" movement with which most of us are familiar. The "concertina" method involves hitching one part of the body forwards in loops, while the reminder of the body remains anchored. In "rectilinear" locomotion the body moves forward very slowly in a straight line, as the ventral scales move in waves over the ribs. Rarest of all is the "sidewinding" locomotion, which is ideal for loose sand and is demonstrated by the aptly named sidewinder.

Another characteristic of snakes is their lack of external ears. They can't detect sound like we do, but they are able to pick up some airborne low frequency sounds as well as vibrations from the ground. Thus, even though music is supposed to sooth the beast, cobras can't hear the music played by a snake charmer. They are "charmed" by the rhythmic swaying of his body. Nevertheless, if you find yourself in a precarious situation with a venomous snake, floundering about trying to do your best version of the "Macarena" is not going to help you. The snake charmer is confident in his performance because he has already removed the fangs from the cobra.

The famous forked tongue, although sinister looking when displayed, is quite harmless and has an important role in detecting odors. It picks up particles from its surroundings and transfers them to the roof of the mouth where specialized cells (Jacobson's organ) process the information. If more particles are detected on one side of the tongue than the other it helps the snake to determine the direction of the source of the odor.

Since they don't have eyelids, snakes can't blink and the resulting fixed gaze may be misconstrued as being rude in some social circles and down right aggressive in others! Some snakes, notably pit vipers and certain boas are "technologically" advanced hunters. They have pit organs that serve as very sensitive heat detectors, enabling them to detect their prey at a distance even at night. To their victims, these snakes are nature's own version of heat-seeking missiles.

Northern copperhead ©Patrick M. Collins

The copperhead *(Agkistrodon contortrix)* is the most common of Virginia's three venomous snakes. It can be found throughout the state in fields, forests, marshes, rock outcrops, and even in urban settings.

Canebrake rattlesnake ©Patrick M. Collins

The timber rattlesnake *(Crotalus horridus)* is considered a pit viper. The "pit" appears as a small hole between the eye and nostril, and is specially designed as a heat-sensing organ that allows for the detection of warm-blooded animals and birds.

Cottonmouth ©Patrick M. Collins

Above: The cottonmouth *(Agkistrodon piscivorus)*, also known as the water moccasin, is a venomous snake that lives in the lower Coastal Plain region of state. Below: The northern watersnake *(Nerodia sipedon)* is found throughout Virginia and is nonvenomous. It is often mistaken as a cottonmouth.

Snakes generally capture and subdue their prey by injecting them with venom, suffocating them, or simply biting and swallowing them. The ability to unhinge the lower jaw coupled with the possession of elastic skin allows considerably large-sized prey to be swallowed. Since chewing is not involved it can take days to digest a large animal. Depending on the quality of the meals, some snakes need to eat only several times a year in order to maintain bodily functions.

Chances are you will come across a snake at some time in your life so it's best to become more knowledgeable about them. The Virginia Department of Game and Inland Fisheries' booklet, *A Guide to the Snakes of Virginia* (by Pinder and Mitchell) is a good place to start. It will help make your encounter a positive experience. Admittedly, you can't be prepared for each and every situation; e.g. seeing a two-headed snake for the first time would most probably unnerve the best of us. However, such occurrences are extremely rare (and in any case two heads are supposed to be better than one, right?) If you really can't stand the sight of snakes, the best way to completely avoid them is to move to Antarctica, Iceland, or Ireland because there are no snakes there. Folklore credits Saint Patrick for banishing snakes from the Emerald Isle. Those people who would rather not emigrate, but still don't fancy getting too close to our scaly friends no matter how benign they may be, should consider the following management tips for the home. Keep your grass short and leave a 3-foot gap between the house and any shrubbery. Remove woodpiles and the like that you may have stored against your home and seal any cracks or holes in the structure. These measures help to reduce hiding places and access for snakes and

Northern watersnake ©Lynda Richardson

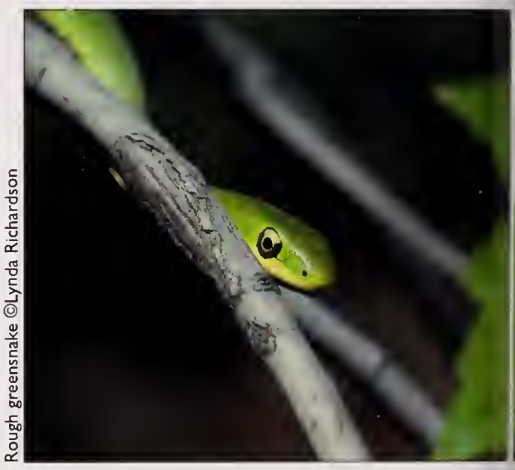
the rodents, which they seek. Rodents are also attracted by cat and dog food that may be left outside so this practice should be avoided.

Of the 30 species of snakes in Virginia, only three are venomous. Naturally, most people are interested in what distinguishes a venomous snake from a non-venomous one. In Virginia there are a number of features that can be used to help with the identification process. These features include the shape of the head (not always reliable, but generally triangular for venomous snakes and more rounded for non-venomous), the possession of large fangs (venomous snakes, of course) and the shape of the pupil of the eyes. Venomous snakes have narrow, vertical pupils (which also seem to make them look meaner) as opposed to the round ones of non-venomous snakes. Perhaps the best policy for dealing with live snakes is to make a determination from a distance using binoculars if available. Color identification is helpful, but since there are some non-venomous snakes that resemble venomous ones it takes a little practice to avoid confusion. Another useful tip is that the venomous cottonmouth swims with nearly all of its body on the water surface while the similarly colored non-venomous northern watersnake swims with only its head and part of the neck above the surface.

The cottonmouth (water moccasin) is so named because it opens its mouth wide open when disturbed to reveal a cotton-white interior. This snake can be found in southeastern Virginia. The copperhead, not surprisingly, gets its name due to its coppery-colored head and it also has similarly colored hourglass patches across the body. This is the most common venomous snake in the U.S. Probably more Americans have been bitten by the copperhead than by any other venomous snake, but deaths from its bite are rare. In fact, it is the least venomous of the three venomous species in Virginia. By contrast, it has been estimated that cobra and krait (small cobra-like snake) bites kill almost 30,000 people every year in India. The third species of venomous snake in Virginia is the timber rattlesnake, which is usually found far from areas of human habitation, making an encounter with a timber rattler an unlikely event. Even harder to come by is the canebrake rattlesnake, a southeastern species of the timber rattlesnake, which is listed as a state endangered species.

The best thing to do when encountering a snake is just to leave it alone. Most snakes are not dangerous and generally try to avoid humans, but when disturbed they may hiss, snap, or emanate offensive odors as part of their defense strategy. The hog-nosed snake's novel approach is to play dead. Contrary to

Right: The rough greensnake *(Opheodrys aestivus)* is harmless and non-aggressive. It is found statewide and its brilliant green color is a natural camouflage. Below: Two very cautious racer snakes *(Coluber constrictor)* are pairing off during the act of courtship.



Rough greensnake ©Lynda Richardson

Black racers ©Lynda Richardson

Brown watersnake ©Patrick M. Collins

Hog-nosed snake ©Patrick M. Collins

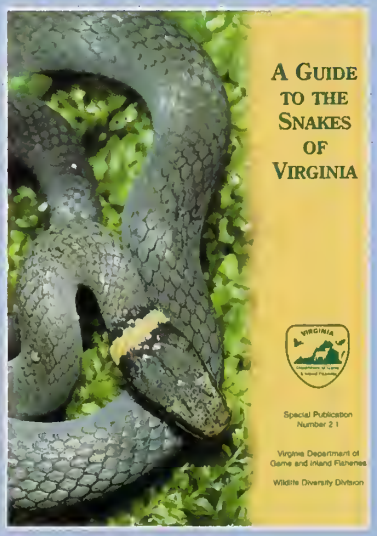
Top: The brown watersnake *(Nerodia taxispilota)* is nonvenomous. It looks similar to a cottonmouth and is found in the lakes, rivers, and marshes of southeastern Virginia. Above: Able to put on a good show by hissing and flattening its head and body, the hog-nosed snake *(Heterodon platirhinos)* is harmless. If unsuccessful in deterring a threat, the hog-nosed snake will roll over and play dead.

what you might expect, snakes have many useful purposes. Virginia's most commonly encountered snake, the non-venomous black ratsnake, helps to control the rodent population. Perhaps the most noteworthy reptilian benefactor to our society is the non-venomous kingsnake, which actually eats other snakes including the venomous copperhead as part of its diet. This seems like a win-win situation.

Many of the snakes in Virginia spend most of their time underground, while others spend considerable time under cover. Their diets vary; however there are certain snakes that rely on very specific prey items. The rainbow snake feeds exclusively on eels, the queen snake feeds solely on molting crayfish, and the hog-nosed snake feeds almost completely on toads. Talk about monotonous diets! Catfish is the preferred main course of the brown watersnake. Those of you who have ever held a live catfish know how easy it is to be injured by the dorsal or pectoral spines of this belligerent fish. Imagine having to instead swallow a live catfish. The catfish (primarily channel catfish) is maneuvered through the snake's digestive system in such a way that the spines are folded down—a slow and delicate procedure as you might expect. Conservationists will remind us that if the prey of such specialist predators becomes scarce or eliminated, so does the predator which depends on it.

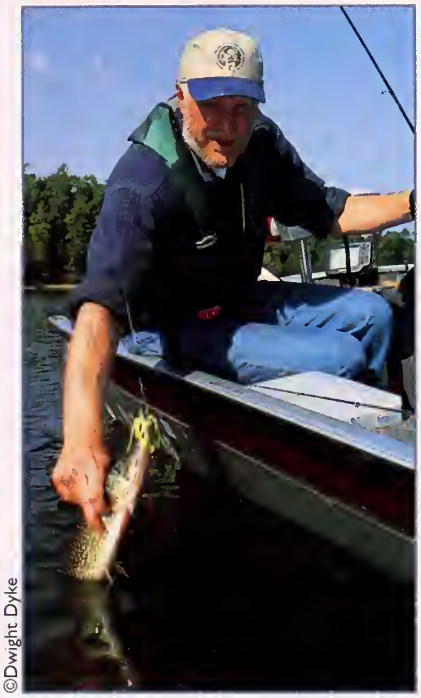
In Rudyard Kipling's *Jungle Book* Bagheera the panther and Baloo the bear were forced to seek the assistance of Kaa the python to free the kidnapped Mowgli from the Bandar-log. Bagheera invoked the Snake's Call for protection ("We be of one blood, ye and I") and Kaa came to the rescue. These days it is often the case that snakes are the ones in need of help. All too often a lack of knowledge combined with a scant appreciation of snakes has resulted in many beneficial, harmless or simply non-aggressive ones being needlessly killed due to unfounded fears or stereotyping. This, combined with an increasing loss of habitat, is probably going to be the major challenge for the survival and well-being of these fascinating creatures. If we listen carefully, the hiss or the rattle may be drowned out by the call for protection. ☐

Mukhtar Farooqi is a fisheries biologist with the Virginia Department of Game and Inland Fisheries.



To obtain a copy of *A Guide To The Snakes of Virginia*, write the Wildlife Diversity Division, Virginia Department of Game and Inland Fisheries, P.O. Box 11104, Richmond, VA 23230 or go to www.dgif.state.va.us.

Fishing for Virginia's Pike Family


©Dwight Dyke

Northern pike, muskellunge, and chain and redfin pickerel comprise Virginia's pike family. Our state's diverse fisheries offer anglers a chance at catching one of these fast-swimming species.

by Marc N. McGlade

They look like a freshwater version of the saltwater barracuda. Their speed, collectively as a family, is akin to an Olympic Gold Medal sprinter, only these fish have more and sharper teeth! Sitting atop the freshwater pecking order lie the pike family: northern pike, muskellunge, and chain and redfin pickerel. These are the slashing, speedy specimens at the pinnacle of the food chain.

Pike family fish were once considered species of the North, but further distribution throughout much of the South has enabled Virginia anglers to capitalize on these wily predators. These "coldwater" species flourish, and in particular, the northern pike and muskellunge—"muskie" as they are affectionately known—grow to enormous sizes.

From the perspective of any type of pike family prey, it is safe to say these species are among the most voracious fish finning about in Virginia's freshwater environments. In short, they have an insatiable appetite and incredible resolve to ambush and chase prey until their bellies are full.

The Making of a Predator

"The remarkable thing about fish in the Esox family is their ability to capture prey," said Chip Long, a fisheries biologist from the Chesapeake office of the Virginia Department of Game and Inland Fisheries (VDGIF). "Northern pike, muskie, and pickerel are 'lying in wait' predators. Due to their anatomy—which is long and slender and their fins placed far back on their body—they can accelerate with phenomenal speed to capture prey, making them very effective predators."

©Marc N. McGlade

These fish are often stocked to reduce numbers of problem fish such as gizzard shad or to rectify stunted sunfish populations.

The pike family, or Esocidae in biological terms, are tremendous fighters. Each has distinctive markings, and anglers can easily distinguish one from the other with a little on-the-water practice. The northern pike *(Esox lucius)* has light oval rings lying on top of a dark background. Northern pike and both redfin and chain pickerel have the moniker "jack," or "jackfish," a regional name in Virginia and the rest of the South.

During spring and fall northern pike habitat consists of shallow-water areas. They have an affinity for weedbeds similar to the other species within the family. In hot weather they are known to find deeper water, especially near drop-offs and ledges.

Left: The pike species are among the top predators that live in freshwater. Above: Diascund Creek Reservoir and Chickahominy Lake are popular locations for catching big chain pickerel.

Michael Simon

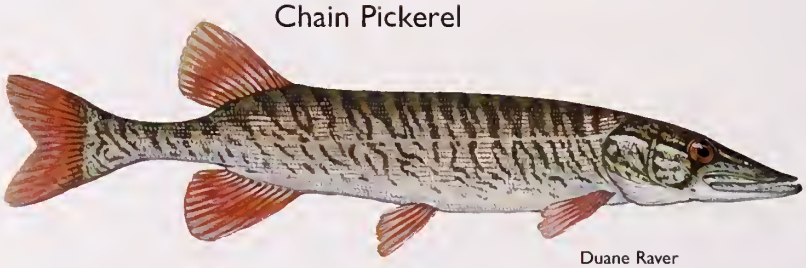
Northern Pike

Michael Simon

Muskellunge

Michael Simon

Chain Pickerel



Duane Raver

Redfin Pickerel

Pike Family

According to VDGIF biologists, they feed on other fish, including minnows of all sizes, suckers, shad, and yellow perch. Northerns also feed on frogs, salamanders, worms, insects, mice, muskrats, snakes, ducklings, other birds, and any other terrestrial animal that makes the mistake of traipsing into the water.

The muskie *(Esox masquinongy)* is the largest member of the family, and it is the only one that lacks scales on the lower half of the gill cover and cheek. Dark vertical bars, nestled on a light background, punctuate its markings.

This bruiser favors habitat in cool, clear lakes, particularly those with vegetation. Virginia muskies also reside in quiet stretches of rivers.

"Due to their voracity and foraging skills, one muskie may require a home range of about five acres—in the absence of other competitors, namely other muskies—in order to have enough food to survive," Long said.

As for their dietary preferences, muskies consume anything available. Other fish are their mainstays, primarily soft-rayed species such as suckers, carp, and shad. They will dine on frogs, ducklings, muskrats, and other mammals, too.

VDGIF biologists obtain muskies in various ways: They can horse trade different species with other states, or muskies can be raised in the Buller Fish Cultural Station in Marion or the Front Royal Fish Cultural Station.

The chain pickerel is often mistakenly called a pike. Chain pickerel *(Esox niger)* have a definitive black "tear" stemming from both eyes. It appears as if the "jack" is crying a black tear, which is in sharp contrast to the white and greenish colors of its cheek and jaw. Anglers, though, may be the ones crying tears after battling one of these voracious feeders. This little cousin to the northern pike is equally as vicious as its larger relative, although it grows a fraction of the pike's size.

Being predaceous, pickerel feed mostly on minnows, small fish, and frogs. They tend to be solitary fish, hiding and lurking in aquatic vegetation or brush, just waiting for some unsuspecting prey to happen by.

Redfin pickerel *(Esox americanus)*—or barred pickerel—are much less common than chain pickerel, considerably smaller, and predominately confined to the Tidewater region of the Commonwealth.

"Redfin pickerel are not really considered a sport fish even though they are in the same family as northern pike and muskellunge," Long said. "Even as adults, this species is small. They thrive in darkly stained waters with low pH which is why they are so prevalent in Tidewater."

Unlike the muskie, northern pike and pickerel do not require much of a home range within a body of water to live, grow, and reproduce, added Long.

How to Catch These Speed Demons

Hoodwinking pike family species is usually best in the cooler months, although summertime can also produce nice fish. They will bite throughout the winter when other freshwater species snub your offer-

©Marc N. McGlade

ings. They pummel live baits and equally favor artificial lures—which they will chase and follow until they scare the dickens out of unsuspecting anglers who are not on high alert. Like other fish species, some days they actively feed and anglers can enjoy instant success, while other days, they need enticement.

Equipment basics for chain and redfin pickerel are very different from muskie and northern pike. Lighter line and rods with less backbone will do fine for pickerel fishing, but when chasing monster-size muskie and pike, heavier gear is the norm. Light-action or medium-action rods and reels spooled with 6- to 10-pound-test line work fine for pickerels. Most savvy northern pike and muskie anglers opt for baitcasting rods and reels spooled with line classes ranging from 15- to 20-pound-test, sometimes larger. Employing a wire or titanium leader will reduce the chances that any of these toothy critters slice your line, resulting in a lost fish.

Speaking of teeth, use extreme caution when landing and unhooking any species that has a full mouth of chompers. A landing cradle, needle-nose pliers, a pair of jaw spreaders, and a hook remover are essential when targeting northern pike, muskie, and chain and redfin pickerel.

Northern pike are lurkers, solitary, and very much a predator of weedbeds. Skilled anglers who hook northerns will find they often leap, spraying water as they try their best to escape. Next to the pickerel, pike are the easiest to catch of the family members. Standard fare for fooling them with artificial lures starts with spoons and wobblers. Plugs—jerkbaits, stick baits, chuggers, and diving crankbaits—work well, too. A large, in-line spinner dressed with a bucktail is another good lure to try. These lures can be cast-and-retrieved, or trolled. Fly-rodders can score using large streamer flies. Livebait choices are best left to large, active minnows or other baitfish fished beneath a float.

Muskies prefer cold, clear water along weedbeds or quiet pools of rivers. Spring and fall are the optimum times to try for this elusive species. The sizes of lures used for muskies resemble what many anglers consider a good catch in itself!

Above: Brett Levin, the Sport Fishing Education Coordinator for VDGIF, admires a prized 19-pound muskie he caught from Rural Retreat Lake. This small lake, tucked away in Wythe County, harbors a quality muskie and northern pike population. Right: Northern pike are weed-oriented fish species that pounce on live baits and large artificial lures.

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In a Nutshell...

- For more information regarding Virginia's pike family, contact the VDGIF office serving the region or visit their Web site at www.dgif.state.va.us.
- Use extreme caution when landing and unhooking any species that has a full mouth of teeth. A landing cradle, needle-nose pliers, a pair of jaw spreaders, hook remover, and wire leaders are essential when targeting northern pike, muskie, and chain and redfin pickerel.
- Pike family regulations:
  Northern pike–20-inch minimum, two per day;
  Muskie–30-inch minimum, two per day;
  Chain pickerel–no minimum size, eight per day except in Lake Gaston and Buggs Island Lake, where no limit is enforced;
  Redfin pickerel–no minimum size, unlimited per day.
- Does your catch qualify for a trophy fish certificate? Here are the minimum requirements: northern pike–30 inches or 6 pounds; muskie–40 inches or 15 pounds; chain pickerel–24 inches or 4 pounds.
- Catch-and-release is paramount to sustaining fish populations, especially for trophies. Harvesting some fish, however, helps keep populations in check and curtails stunting of existing fish species. Use common sense and only keep what you intend to eat—release the rest to live to fight another day.

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When it comes to lures—bigger is better. Spinners, crankbaits, and spoons get the nod when fishing for muskies and northern pike.

Gigantic diving crankbaits, huge in-line spinners, big spoons, and bulky topwaters are traditional.

Muskies are seldom bunched up, therefore, trolling is a tried-and-true technique to cover extensive areas. Intersections of feeder tributaries to the main lake can be productive locations for trolling. Casting for muskies is effective, but anglers must be willing to expend energy and effort chasing these incredible fish. When casting or trolling for these brutes, look for edges of weedbeds, open channels, brush piles, log jams, and rock ledges.

Live baits are also a productive way to catch muskellunge. The favored live bait among tight-lipped muskie anglers is a large sucker, upwards of 12 inches in length.

Lure and live-bait choices are simplistic for pickerel. For live bait, minnows are the top choice. Pickerel are generally found in shallow water so employing the use of a float with the minnow works well, but so does free lining.

Most largemouth and smallmouth bass lures work very well at fooling this predator. Plastic grubs and worms, soft and hard jerkbaits, spinnerbaits, in-line spinners, shallow-diving crankbaits, and lipless rattling crankbaits all take their share of this speed demon. Bucktails are one of the best fakes to fool these fish.

Bright colors elicit more strikes from pickerel and, in fact, from the rest of the family, too. They feed mostly by their sense of sight, and bright offerings will normally outperform white- or gray-colored lures, even though minnows are their favorite food source.

Many anglers think pickerel are strictly a weed-oriented fish. They do spend a significant amount of time prowling along weedy edges, but they also have a distinct preference for wood. Blowdowns, brush piles, piers, and other woody debris allow them to hide and ambush unsuspecting prey.

Best Spots in the Old Dominion

Some good lakes to try for northern pike are Harwoods Mill, Rural Retreat, Orange, Occoquan, Motts Run, and Arrowhead.

Topnotch river locations for muskies include James, Clinch, Shenandoah, and New, while quality lakes are Smith Mountain, Rural Retreat, Burke, Western Branch, Flannagan, and Hungry Mother.

Joe Williams, a fisheries biologist in the Blacksburg office of VDGIF said, "There is limited reproduction of muskies above Claytor Lake in the New River. We'll know soon if we have any below Claytor, as a Virginia Tech graduate student is conducting research for VDGIF and Tech."

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Above: Live minnows, either fished beneath a float or free-lined, are good choices for luring members of the pike family. Below: Milfoil, coontail, floating duckweed, and other forms of aquatic vegetation are good places to find members of the pike family. Pictured here is Chickahominy Lake.

Once the data becomes available, VDGIF will understand even more about this intriguing fish regarding its food habits, habitat preferences, and reproductive success.

"There is also some natural reproduction in the headwaters of the James River," Williams said. "In most parts of the state, however, the muskie population is due to annual stocking. Here in the southwestern region, we need to stock muskies to complement the limited reproduction to sustain a quality fishery."

If jumbo chain pickerel is your game, the Coastal Plain is the best region. Chickahominy Lake, Diascund Creek Reservoir, Little Creek Reservoir, and Lake Cohoon duke it out for the top spot in the state. In these locales, 4-pounders are commonplace.

Not to be outdone, Suffolk's Lake Prince and Western Branch Reservoir are home to a good pickerel fishery. Both bodies of water are widely known as multi-species hot spots.

All of these lakes and reservoirs mentioned provide a trophy fishery, but they also have many smaller fish. The average chain pickerel runs roughly 1½ to 3 pounds statewide, and in lakes that have good numbers, it can be tremendous fun catching them when the "bite is hot."

"As for chain pickerel, they are abundant in the Coastal Plain," Long said. "These fish can be found in shallow areas, hiding in aquatic vegetation, and are readily caught on a variety of baits. Numerous trophy fish are caught every year in Tidewater from lakes and rivers."

There are a host of other bodies of water across Virginia that harbor jacks, including: 50-acre Douthat Lake in Clifton Forge, Lake Moomaw near the West Virginia border along Bath and Alleghany counties, and Suffolk's Burnt Mills Reservoir.

Virginia's rivers hold good concentrations of pickerel as well. Chickahominy, Dragon Run, Mattaponi, Nottoway, and Blackwater rivers are all good spots to try if you're a river rat or live near these beautiful waterways.

State Records

Virginia's state records for pike family species are impressive. The state-record chain pickerel is a 7-pound 10-ounce beast taken from Lake Shawnee in Powhatan. The northern pike champion hails from Motts Run Reservoir, just to the west of downtown Fredericksburg, and weighs 31¼ pounds. The biggest muskie to grace the scales in the Old Dominion weighed 45 pounds and took up residence in the famed New River.

With fish in these size classes, isn't it time you tangle with some under appreciated foes? A muskie has been said to be "the fish of a thousand casts." Not so with pike or pickerel, but all four species are tackle-testers and a joy to anglers who pursue them. □

Marc McGlade is a frequent contributor to Virginia Wildlife *who enjoys pursuing Virginia's toothiest freshwater inhabitants. He's a fishing instructor and lecturer residing in Midlothian, Va.*

Wild in the Woods

Habitat on Public and Private Lands

by Carol A. Heiser
illustrations by Spike Knuth

In these days of chronic drought and high-paced development pressure, our wild lands and private open spaces can use all the TLC they can get. Conservation societies, wildlife organizations, and private citizen groups all do their part to help monitor and protect the health of our fields, forests, and aquatic resources. State agencies, too, play a fundamental role in environmental stewardship by maintaining diverse ecosystems on public lands. Whether the land is a state forest administered by the Department of Forestry, a park operated by the Department of Conservation and Recreation, or a wildlife management area run by the Department of Game and Inland Fisheries, we "manage our precious natural resources using the best scientific information available," in the words of one biologist.

Private landowners can learn many techniques and gain insights from these state models. Conservation measures are constantly being developed or improved on, as new information comes to light, in a continuum that tests and retests which methods still work and which ones need to be revised. State and federal incentive programs, such as the provisions of the most recent Farm Bill, afford opportunities for private citizens to implement these tried and true management methods on their own property (look for more about the Farm Bill in an upcoming issue of *Virginia Wildlife* magazine). Since most of the land in Virginia is privately owned, effective private stewardship is essential to the health of the vast majority of our resources.

There are many conservation measures that can be easily adapted to your property, large or small, and that might qualify for cost-sharing through the Farm Bill provisions. Sev-

Managing diverse tracts of land can be a challenge to wildlife biologists.

eral of these measures are best illustrated with an in-depth look at our state wildlife management areas.

They're Not Parks!

First, one needs to understand what a wildlife management area is and isn't. Wildlife management areas, or WMA's, are operated by the Virginia Department of Game and Inland Fisheries for the primary purpose of wildlife conservation. Although a casual visitor might think that the wide open spaces and inviting woodlands look like a park, in reality a wildlife management area is anything but a park.

Wildlife management areas are lands that the Department purchases for the purpose of wildlife restoration, mainly through the provisions of the Pittman-Robertson Act. The agency must comply with rules governing how the areas are to be used, as well as what constitutes "restoration" and how the sites will be maintained. The state cannot arbitrarily decide on alternate uses, because it is obligated to manage the land according to guidelines administered by the U. S. Fish and Wildlife Service.

Restoration includes a variety of management strategies, such as establishing wetland impoundments, prescribing fire, managing timber for wildlife, protecting streamside buffer zones, planting and maintaining food plots, or preserving unique habitat types. Species that are benefited include mammals, songbirds, game birds, waterfowl, and numerous aquatic species. Because these practices increase an area's available food and cover, wildlife diversity is greatly enhanced. While these practices make the sites excellent places for wildlife watching and outdoor recreation, the areas are not administered as park settings but instead as managed, conservation systems. Passive recreational uses, such as hiking or horseback riding, are considered secondary purposes and are simply an indirect benefit of the habitat management that takes precedence.

The northern cardinal *(Cardinalis cardinals)*, feeding on poison ivy berries, is found throughout Virginia and adapts well to just about any kind of habitat.

Diverse Use

Since WMA's are managed to optimize wildlife populations, these sites are the favorite locations of hunters and anglers, whose purchase of hunting and fishing licenses provide the agency with funds needed to drive the conservation measures. Wildlife managers stock streams, plant food plots, and manipulate forest stands to maximize opportunities for fishing, hunting, and trapping.

Of course, WMA's are public lands that are open to anyone who wants to visit. Hikers and birdwatchers equally enjoy the numerous amenities available, such as scenic drives, stands of wildflowers, walking trails, footbridges over streams, and observation platforms or overlooks. School groups are also welcome and frequently visit WMA's for educational field trips.

Virginia operates 34 wildlife management areas, from the beach to the mountains, which total 200,000 acres and represent an expanse of diverse ecosystems, land types, and wildlife populations. Along the coast, for example, wetlands are restored or protected at Princess Anne WMA near Virginia Beach, and also at Mockhorn Island WMA on the Eastern Shore. Some management areas are rather small, like the 429-acre Game Farm WMA in New Kent County. Others are quite extensive, like the 26,000 acres on the Clinch Mountain WMA, an 18 mile long piece of property which straddles Smyth and Washington counties. The newest WMA is Big Survey in Wythe County, a beautiful parcel of over 8,000 acres that boasts panoramic mountaintop vistas and rare plant and animal communities (see feature article in the October 2002 *Virginia Wildlife*).

One of the most commonly seen mammals in Virginia, the gray squirrel *(Sciurus carolinensis)*, spends most of its time foraging for food, which includes nuts, buds, and fruit found on trees and plants.

different sections on a rotating basis. Various open fields might be scheduled for discing or planting every year. Some forested compartments might be thinned every 10 years, and still others slated for clearcutting every 100 years. Prescribed burning of various compartments is done on a rotation in a similar fashion. In this way, the compartments form a mosaic of large tracts of habitat types, and the WMA maintains varied habitats for a diversity of wildlife on a continuous basis.

Each September, hunters converge on many of the Department's wildlife management areas to pursue fast flying mourning doves *(Zenaida macroura)*.

Setting Goals

Managing such topographically and ecologically diverse tracts of land can present quite a challenge to wildlife biologists, and they must, therefore, "read" the land to set appropriate goals. The Clinch Mountain WMA, for example, is the most biologically diverse of the management area system, in part, because of extremes in elevation, which range from 4700 feet atop Beartown Mountain to 1600 feet along narrow valley floors. Elevation has a direct bearing on the composition of the plant community, and tree species common to both southern and northern forest types are found here. Forestry, therefore, figures prominently in the management rationale on this site. The goals for this property are 8000 acres of forest management, 5000 acres under ecosystem management, 75 acres of regeneration (which involves clearcutting and then allowing the area to grow back naturally), and three to five percent open land habitat management. Timbering may yield sawtimber and veneer saw logs; other cuts might result in a firewood sale.

Obviously, the land managers wouldn't do all these practices at once. Instead, they divide the property map into compartments and concentrate on

Management in Action

There are many more conservation methods used on our WMAs that you can adapt to your own property. For example, a combination of thinning, planting, and burning is often used on tracts of pine and hardwood forests, which the WMAs manage for a variety of purposes. Thinnings might be employed that remove only a portion of the trees in a stand. This practice "releases" desirable tree species like white oak or northern red oak from competition, so that more light, nutrients and moisture will favor their growth. Oak trees are a particularly valuable food source for hungry deer, bear, wood ducks, turkey, and other animals. In situations where an area needs rejuvenation, a clearcut might be done to stimulate new growth or to prepare a fresh planting bed. If the cutover area has an adequate source of desirable regeneration available, it may be left to grow back naturally; otherwise, the site might be planted with new tree seedlings.

Sometimes it's necessary to salvage timber from an area that has been damaged by an ice storm or insect outbreak, and in the process, small openings for wildlife are created. New openings provide a burst of plant diversity because they allow more light for species like blackberry, blueberry, wild grape, chokecherry and poison ivy to grow. These plants will then produce the soft mast (fruit) that benefits songbirds, game birds, and mammals.

In other cases, the forest floor might be burned with a low-intensity fire that is prescribed to remove an over-accumulation of dead material: too much leaf litter and downed branches could provide the fuel for a much more devastating wildfire later. Prescribed fire also helps keep some forests open, like a stand of loblolly pine, to reduce competition with understory species.

More Wildlife on Your Property

The methods mentioned above are a sampling of the tools you can choose when planning how to tackle "the back 40." Another habitat technique used successfully on WMAs that could also be done on your property is open field management. At the Phelps WMA in Fauquier County, open fields are kept open by managing them with controlled burns, which are done on a rotation every two to three years. These low-intensity fires remove woody growth and perpetuate an early stage of herbaceous (green-stemmed) vegetation like grasses and forbs. Rotation discing on the contour produces much the same plant diversity.

You might also consider converting some of your open fields to native warm-season grasses and maintaining them for meadow-loving wildlife species, like they do at the Powhatan WMA or at White Oak Mountain WMA in Pittsylvania County. Traditionally, open fields have been stabilized with a cover of fescue grass, which is a cool-season species that is tough under livestock use and is suitable for erosion control under some conditions. Unfortunately, fescue forms a dense mat which is not suitable for grassland wildlife species that depend on open fields for food and cover, such as quail, turkey, or the threatened upland sandpiper. Replacing fescue with native species like indiangrass, little bluestem, and big bluestem creates spaces between the grass clumps where wildlife can forage. At the same time, warm-season grasses make good, palatable forage for livestock and are durable in the dry, hot conditions of summer, when fescue is dormant.

Your land might also benefit from additional choices on the plant menu. Patches planted with a variety of seed sources, nectar, and green matter can provide a supplemental food source for wildlife, and this method is a great way to bring birds and mammals in closer for viewing. WMAs regularly maintain a variety of food plots for this purpose. At Fairystone WMA, a 5,000+ acre tract in Patrick County, the primary management objectives are wild turkey and qual-

Wildlife management areas helped to play an important role in the recovery of the white-tailed deer *(Odocoileus virginianus)* in Virginia.

ity deer management. Here, a food plot for deer and turkey might include clovers, grain sorghum, foxtail millet, and sunflower. Small food plots are better than large because they augment diversity. Young turkeys benefit from "brood strips" of wheat, orchardgrass, and white clover planted next to woodlands. Long and linear strips are best, and they are usually disced and reseeded every three to five years.

Improving habitat for geese, ducks, and other waterfowl entails an altogether different type of planting and management regime. Old farm fields that were ditched in bygone years to drain them of water could be restored as permanent wetlands or converted into temporary impoundments, as has been done at many WMAs, such as Hog Island in Surry County, where waterfowl management is the main objective. A 15 to 20 acre basin might be only 24 inches at the deepest point, because many ducks are bottom feeders and must tip their bodies to reach submerged plants. During fall and winter, a water control structure keeps water in the basin, which provides a stopover for migrating waterfowl and a source of food like smartweed and rushes. In February or March, the impoundment is slowly drained. Diminishing water levels create fresh mud flats attractive to numerous sandpipers and other shorebirds. Over the summer, these mud flats are allowed to dry out, a practice which encourages the growth of smartweeds and millets. When fall and winter roll around, the cycle is reversed: the impoundment is once again flooded, and the recent stand of plants becomes the new submerged food source.

Getting Help: The Farm Bill

The Farm Security and Rural Investment Act of 2002—commonly known as "The Farm Bill"—holds much promise for private landowners enthusiastic about conservation on their land. Many of the management methods described above can be incorporated into a plan that may qualify for cost-sharing under various provisions of the Farm Bill. For details about this important program, see the NRCS Web site listed in the "Learning More" section, on page 21.

Did You Know?

One of the most reliable ways to gauge the productivity of oak trees is by counting the number of acorns they produce. "Too many to count; can't be done," you say? On several wildlife management areas, biologists conduct oak tree surveys using a relatively simple practice that records the number of acorns on a sampling of individual trees. These numbers are then interpreted in the larger context of the forest.

Here's an example of how it works. A forest is divided into four sections where they will sample 10 white oaks and 10 red oaks in each. That's 20 trees per section, or 80 trees over the total study area. On each tree in the sample, they choose only 10 limbs to count. Using binoculars, they count all of the acorns they can see in every two feet along each of those limbs; hence the name "ocular" survey.

The resulting data—which is collected during late August and early September—gives them a window on the amount of hard mast (in this case, acorns) that will be available for wildlife. The information is compared with other known data and helps biologists make projections about wildlife responses to the annual food crop.

Corn is not only important as an agricultural crop, but as a food source for numerous animals and birds. It also offers some habitat and protection for smaller animals, including the eastern cottontail rabbit *(Sylvilagus floridanus)*.

Virginia has the best and the longest-running mast surveys of any state in the country. Ocular surveys of mast productivity have been conducted since 1959. The oak mast survey began in 1973, and county foresters have assisted with tree and shrub mast surveys since about 1995.

Learning More

Maps and Fact Sheets:

The Virginia Department of Game & Inland Fisheries Web site at **www.dgif.state.va.us** contains a listing and maps of all of the state wildlife management areas (click on "Hunting"). You can also access "Habitat Management Information Sheets" on a variety of topics, such as thinning timber and establishing field borders. On the main page click on "Wildlife," then on "Wildlife Habitats."

The Wildlife Habitat Management Institute offers a series of informative leaflets on a variety of species—from wood ducks to butterflies—at **www.ms.nrcs.usda.gov/whmi/technotes.htm**.

The Canadian Wildlife Service, Canada's national wildlife agency, provides a broader set of fact sheets on even more species at **www.cws-scf.ec.gc.ca/index_e.cfm**. From the main page click on "Hinterland Who's Who." Or, browse numerous other pages about habitat and management.

Other:

The Natural Resources Conservation Service Web site contains specifics about the Farm Bill, as well as resources for homeowners and lesson plans for teachers, at **www.nrcs.usda.gov**. Children can log on to USDA for Kids at **www.usda.gov/news/usdakids/index.html** for coloring sheets, a science page, a Smokey the Bear link, and more.

Ducks Unlimited has some excellent wetland education materials for teachers, available through their home page at **www.ducks.org/**. Kids can also visit the Greenwings page for "fun and games," activities, and an opportunity to "Ask Dr. Bob" about nature. ☐

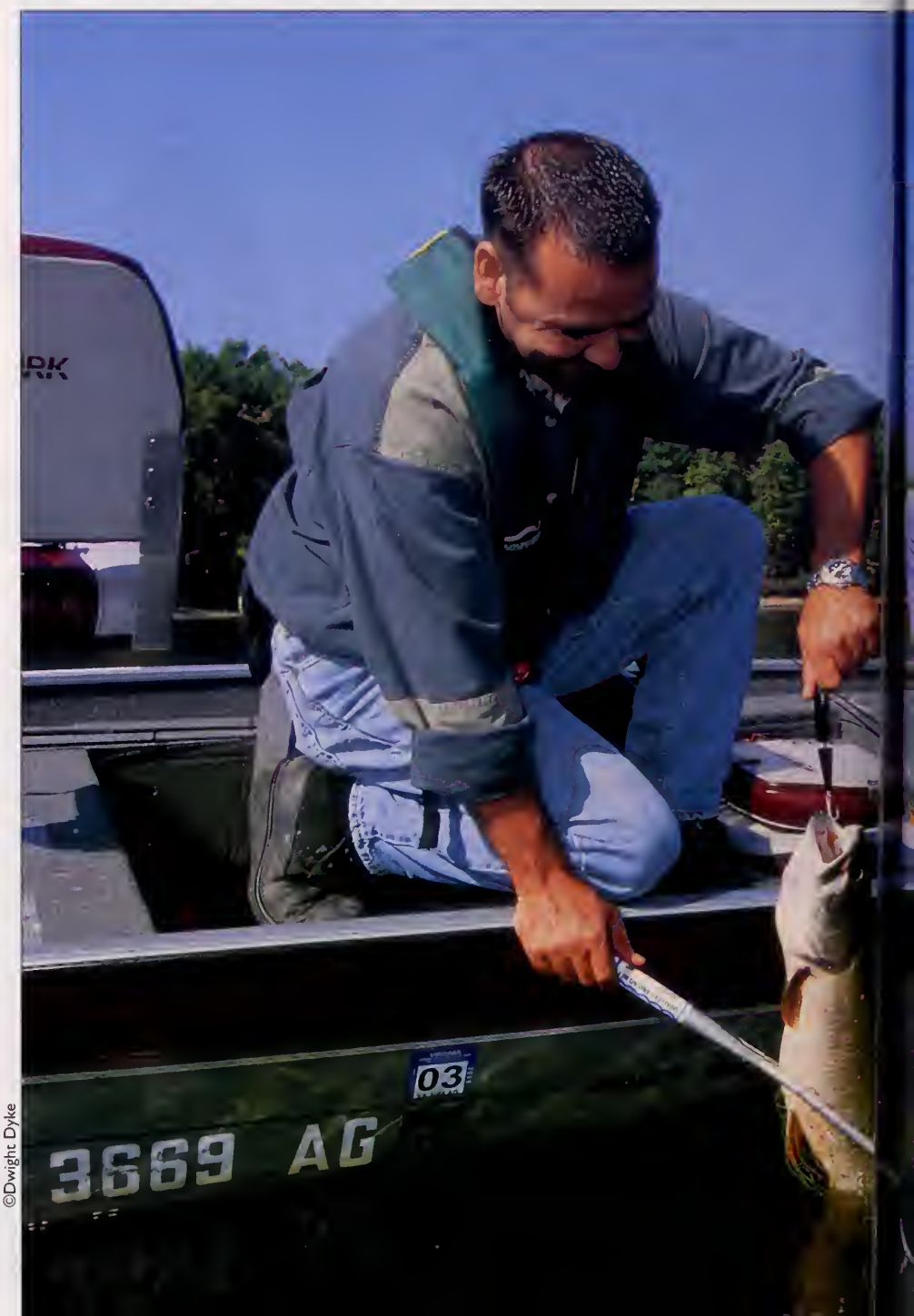
Carol Heiser is a Wildlife Habitat Education Coordinator with the Virginia Department of Game and Inland Fisheries.

A Living Relic of The Triassic Period

by Dean Fowler

This was going to be an awesome bass, the biggest of his life! One that would not only win this tournament, but yield bragging rights for years. The other anglers were going to be green with envy! He already pictured himself standing up on the stage at the weigh-in, holding the trophy fish as all around him ooed and aahed, flash bulbs popped, and the master of ceremonies urged him to reveal his secret honey hole, lure, or technique used to deceive this great fish. But anticipation and pride quickly turned to disgust as the fish launched itself skyward. The bass of a lifetime was not a bass after all. It was a bowfin, or grindle as they're most commonly called. Other surrogate names include dogfish, mudfish, cabbage pike, cypress trout, blackfish, and grinner (owing to the fact that it looks like it's smiling at you when its mouth is closed).

At one time or another, this feisty predator has raised the heart rate and adrenaline of just about every bass angler out there. For some, a trip to confession was required to atone for what was said during those first moments after they realized that this was no bass at the end of their lines. Indeed, some of these guys have nicknames for bowfin that are not fit to print here. Does this



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Never fished for bowfin before? Then you don't know what you're missing when it comes to tackling this feisty freshwater fish.

strange looking creature deserve disdain? Most bass anglers, understandably, would say yes. But there's a lot about this fish that's very interesting, and it really is fun to catch.

The bowfin truly is a living relic. It is the only living species of a primitive order of fish that originated in the Triassic period more than 208 million years ago (older than most dinosaurs!!), and it's one of the oldest species of bony fish living today. It has several characteristics that reflect its primitive origins including a bony plate underneath the head, a hemicercal tail (meaning its spinal column arches upward near the tail fin, but does not extend into it as it does in the heterocercal tail of sharks), and an air bladder that functions as a primitive lung. It even looks primitive; just check out the picture! So where did the name "bowfin" come from? It arose from this fish's very long dorsal fin, which undulates to provide slow and steady propulsion while it cunningly stalks prey. We're privileged to have this species because eastern North America is the only place in the world where they're native.

Bowfin are typically dark green, but sometimes appear brownish or almost black. The darker coloration is more typical in the tea-colored waters of the South, where they are aptly called blackfish. They frequently, but not always, have a black spot bordered with red just in front of the tail (see illustrationon pg. 26). This spot is usually more distinct on males. Their coloration aids in feeding because they are ambush predators that frequently hide amongst aquatic plants. Their large mouths, sharp teeth, and aggressive nature make them a formidable predator. Fish comprise most of the adults' diet, but they are known to frequently eat frogs, crayfish, worms, insects, and mollusks (clams, mussels, and snails) as well. In the absence of sufficient prey, they can even become cannibalistic. Because they're aggressive and not finicky about what they eat, bowfin are relatively easy to hook and even more fun to reel in.

Bowfin have very interesting adaptations that have played an important part in their ability to survive as a species since the time of the dinosaurs. Most important is the ability to breathe air using their primitive lung. This has allowed them to live in waters where oxygen levels are too low for most other fish species. They can even survive for a time without any water if there's moist mud in which to burrow and become dormant. Considering the number of severe droughts that have undoubtedly occurred during the last 200 million years, this primitive lung would seem to be their most important asset for long-term survival.

However, it's not the only one. Despite their primitive origins, bowfin use one of the most important evolutionary innovations observed in many modern fish species. That is, they care for their eggs and young. Like sunfish, bowfin are nesters. Males are the builders and defenders of the nests, which are constructed on the bottom in shallow water among the protective cover of tree roots, logs, or aquatic plants. To provide a suitable surface on which to lay eggs, the male lines the nest with a bed of plants that it has uprooted or bitten off. Spawning is a nighttime "affair." The two fish

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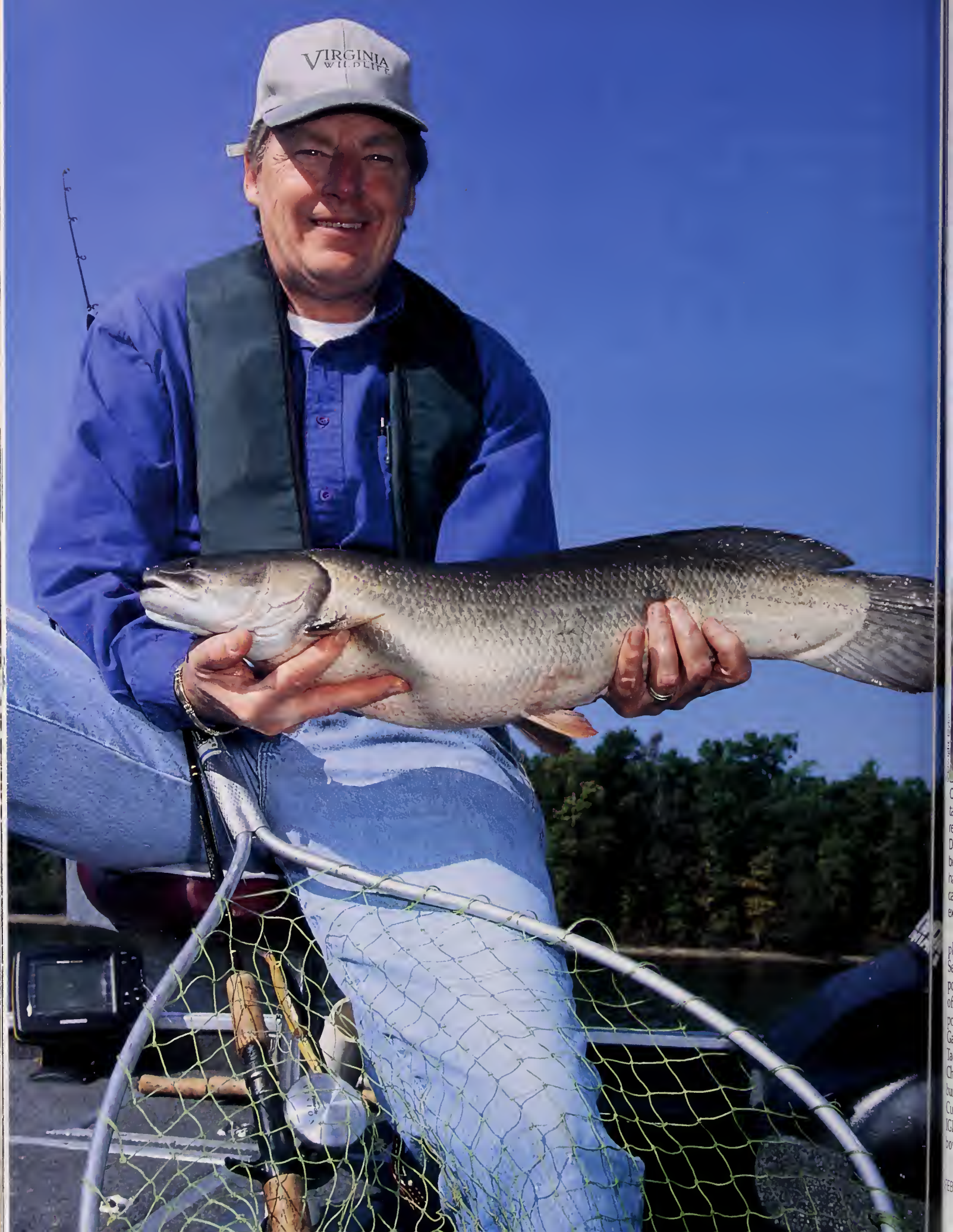
Left: The bowfin's reputation of being a freshwater "bad boy" is evident from its aggressive nature and explosive angling antics. Above: Powerful jaws and sharp teeth make the bowfin the perfect predator fish. Big lures and jumbo minnows are excellent for attracting the attention of a hungry bowfin.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WILDLIFE

court by nudging each other while swimming in a circle around the nest. It's not uncommon for both males and females to spawn with several partners. The male is very aggressive in his defense of the young, which remain close to the nest in tight schools resembling black balls. After a few weeks, when the youngsters are 3 to 4 inches long, the schools leave the nest and their father's care.

Bowfin can grow to more than 3 feet in length, and they've lived as long as 30 years in captivity. In fact, they're one of the largest native freshwater fish on the East Coast. It's not unusual to catch bowfin over 5 pounds, and during 2000, Virginia's Angler Recognition Program (VARP) gave out 30 awards for trophy size bowfin over 10 pounds. Several of these fish exceeded 12 pounds! Virginia's historical record of 17.5 pounds, which is only 4 pounds less than the International Game Fish Association's (IGFA) All-Tackle World Record, was caught in Chickahominy Lake near Williamsburg on November 14, 1964, by E. C. Cutright. Virginia does hold two IGFA Line-Class World Records for bowfin. The 2-pound Line-Class Record is held by Eddy Johnston for a 9-pound 10-ounce fish caught in the Chickahominy River on February 21, 1998. The 16-pound Line-Class Record is held by Belvin C. Palmer, Jr. for a 14-pound 7-ounce bowfin caught in Diascund Reservoir on April 21, 1984. Since the State Record Program was restructured with stricter qualification requirements during 1985, the record category for bowfin has been vacant. A 15-pound minimum was implemented, but no applications have been received. Because the record has been vacant for 18 years, the Virginia Department of Game and Inland Fisheries (VDGIF) lowered the minimum qualifying weight to 13 pounds in 2002. A couple of bowfin exceeding 13 pounds typically have been entered in the VARP each year. Additional fish of this size are certainly caught, but not entered. So, if you want a good chance to get your name in the record books, this is it!

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Opposite page: Ron Southwick, Assistant Director of Fisheries for VDGIF, recommends Chickahominy Lake and Diascund Reservoir for really big bowfin. Above: It is a good idea to have a big net and handle them with care. Bowfin are long-bodied fish and extremely strong.

But why would anyone want to fish for bowfin? Because pound for pound, they're one of the feistiest, most powerful freshwater fish on earth. They're a blast to catch! The following excerpt from an article that I found on the Internet titled "Tough as Nails and Ready to Kill" does such a great job of describing this fish that I had to include it here:

"A terrifyingly efficient predator equipped with an incredibly strong, muscular body and razor sharp teeth, the bowfin is a formidable foe in any situation. I've seen bowfin destroy more tackle than any other fish. They cut up shiners like a rusty chain saw. Mean, nasty fighters, they will sometimes tailwalk for yards when running, and then lunge up onto shore to crawl away into the weeds. Though they are scorned in many areas, they also have a cult following among those people who appreciate tough, nasty fighting fish."

—Anonymous
(www.roughfish.com/10.html)

More anglers should appreciate and enjoy the bowfin's spunk. There just aren't too many freshwater fish that are as exciting to catch.

Despite what you may have heard, some people do eat bowfin, and it apparently provides a tasty meal when prepared properly. I found numerous recipes for bowfin on the Internet. Some folks feel that "planking" is the best way to prepare bowfin. This technique involves nailing the fish to a plank and roasting it over an open fire, then throwing the fish away and eating the plank. To be honest, I've never eaten bowfin, but I'm willing to try it (except for "planking"). Many times in my life I've tried new foods, including some fish, that I did not have a favorable opinion of, only to find out that I really like them. I didn't know what I'd been missing. Why not give bowfin a try?

So, you don't want to try bowfin fillets? OK, how about caviar? I have to admit, this one floored me. While

Top: Chinese snakehead fish, photo by USGS/Center for Aquatic Resource Studies. Above: Bowfin

surfing the Internet for information on bowfin, I ran across a vendor that sells bowfin (or "Choupique," as bowfin are called in Cajun country) caviar. That's right, bowfin caviar! Actually, it's considered to be quite good. Read these complimentary descriptions of Choupique caviar from the vendor's Web site: "the fish's naturally black eggs resemble that of the sturgeon, with a distinctive, lively flavor"; and "this archaic freshwater bony fish produces natural black eggs that resemble sturgeon roe. Very clean with shiny, nicely separated berries and a lively, distinctive flavor." It also looks a lot like sturgeon caviar (see picture), although I'm no connoisseur. Based on its price, about $30 for a 3-ounce tin, it's not bottom of the barrel stuff. In fact, it's more expensive than caviar from salmon, trout, and whitefish. There's even research being done by aquaculturists to determine if bowfin can be raised commercially just for their caviar. I never would have guessed! This coming winter or spring you should head out to your nearest bowfin hole to load up on "free" caviar!

Ok, I've convinced you to try bowfin fishing. Where should you go? Bowfin are found throughout much of Virginia, but they are most common in warm, lowland areas in the eastern piedmont and coastal plain. The best populations are typically east of I-95. Lakes, ponds, swamps, and the backwaters and mainstream areas of sluggish lowland rivers are typical bowfin habitats. The best bowfin fisheries are almost exclusively in bodies of water that have lots of aquatic plants, at least in localized areas. It seems that bowfin need aquatic vegetation for successful reproduction. The best places to catch jumbo bowfin are Chickahominy Lake and Diascund Reservoir near Williamsburg, and Lake Cohoon in Suffolk.

What baits and tactics work best for catching bowfin? Because they're so aggressive and not finicky eaters, just about any bait will work. Minnows are very effective. Although many types of artificial baits work, some of the best include spinners (particularly beetle spins and spinner baits) and plastic worms. Most bowfin are caught along shallow shorelines where aquatic plants are abundant. But, they'll also frequent shallow areas containing woody debris such as sunken trees. If you catch one, make sure you don't try to lift it into the boat by "lipping" it. If you do, I'm sure you'll never try it again! They have sharp teeth and they're strong and slippery, so the best way to land them is with a net.

One last thing; don't mistake a bowfin for a Chinese snakehead fish, that notorious non-native fish that took over a pond in Maryland and struck fear into many an American fisheries biologist. We've investigated numerous reports of snakeheads caught in the wild that turned out to be bowfin. Consult the following link on our Web site for information on how to tell the difference between these species: (http://www.dgif.state.va.us/fishing/snakeheads.html).

Now that you have a better understanding of this interesting and mysterious fish, I hope you'll get out and give bowfin fishing a try. Remember, Virginia boasts two current line-class world records and a historical record that's only a few pounds shy of the All-Tackle World Record. We live in one of the best bastions of bowfin in the country. Who knows...you might be the next state or world record holder! ☐

Dean Fowler is the Fisheries Outreach Specialist with the Virginia Department of Game and Inland Fisheries. Dean would also like to acknowledge that much of the biological information in this article came from the book The Freshwater Fishes of Virginia *by Robert E. Jenkins and Noel M. Burkhead.*

Bowfin Recipes

Bowfin Boulets
www.landbigfish.com

Breaded and Fried Bowfin Fillets
www.fishing.about.com/library/weekly/bl000612.htm

Smoked Eel, Smoked Sturgeon, and Choupique (Bowfin) Caviar Salad with Dilled Buttermilk Dressing
http://www.foodtv.com/-foodtv/recipe/0%2C6255%2C21990%2C00.html

Bowfin caviar photo provided by Collins Caviar Co. Chicago, Ill.

First Cast

story and photos
by Marcia Woolman

Do you remember your first trout? Sure you do. There is something magical about finally fooling one of those wily salmonoids. It becomes etched forever in one's memory. Of course the longer it took to catch it, the brighter the memory burns. Well, as a First Cast Instructor one gets to relive that magnificent moment over and over again in the eyes of the students. To share that special moment is indeed reward enough for the time invested in creating the newest of our fly-fishing conservationists.

First Cast is a program initiated by Trout Unlimited (TU), but it is only one of many great youth education programs presently being implemented throughout the state of Virginia. Trout Unlimited is not the only organization that has come to realize that the only way we will have stewards of our streams and watersheds is to cultivate a love of the resource while they are young. The very best way to do this is to have kids learn to fish. It is very difficult to enjoy fishing and not come to realize that fishing will only be as good as the water the fish live in, and how clean that water remains is up to us.

In an effort to capture the energy and imagination of children as potential conservationists, Rapidan TU has developed over the years a very comprehensive youth education program for which it has received national recognition. The first effort took the form of a "Kid's Day" which, for 22 years, has been held on the Graves Property near Graves Mountain Lodge in Syria. The object of this effort is to merely expose kids to the joys and excitement of fishing. The Virginia Department of Game and Inland Fisheries (VDGIF) does a special stocking so the stream is full of fish for Kid's Day. It is a fun-filled family day that yields lots of smiles and firm desires to fish again.

More recently, during the past three summers, TU has provided the volunteers for a program at Camp Fantastic, a camp for children with cancer, near Front Royal. This school is more comprehensive than the Kid's Day as it offers a chance to explore a stream and learn about the insects

For 22 years the Virginia Department of Game and Inland Fisheries, the Graves family, and the Rapidan Chapter of TU have made it possible for thousands of kids to experience the thrill and joy of fishing.

(macroinvertebrate) that live there. The kids also learn about the food chain, and how these insects provide food for the trout. They learn about healthy streams and how erosion makes streams sick. They then get to try their hand at fly-tying to make something that looks like the bugs about which they had just learned. Last but not least, the afternoon is spent learning to fly-fish at a local pond or stream where the kids experience the joy of feeling that rod pulsate in their hand, and maybe even get to land their first fish.

New this year, is the highest level of First Cast, which is a totally comprehensive educational effort that lasts over a period of 4 months. It educates the student in fly-tying, entomology (the study of insects), conservation practices, fishing etiquette, catch and release, knot-tying, casting, and fishing both in a pond and on a stream. Upon completion of this class the goal is to create a brand new fly-fishing conservationist.

The idea is to develop an understanding of how all of Mother Nature has a role in where and how we catch trout. The first step is learning about the macroinvertebrates that live in the stream. These insects are like the "canary in the coal mine." If water quality starts to degrade these mayfly and stonefly nymphs will disappear from the stream. This should sound an alarm that water quality is changing and will not hold trout if it is not pure enough to support these insects.

Once this important relationship is understood, the students can move on to learning about stream improvement projects that will make better riffles for insect habitat. Once there are more insects the stream will support or hold more fish. The other part of the equation has to do with water quality and the dangers of such things as acid rain and erosion from farms and developments. A diorama brought by a member from the local soil and water conservation district is used to illustrate how fragile streams are and how they can be impacted from runoff.

On the way to becoming an angler, there are many things one can learn before ever picking up a fishing rod. One other important step is learning to tie flies. Once it is understood that the fish feed on these underwater life forms then the job of replicating them at the tying vise becomes the next challenge. An entire month is spent on fly tying, and the students learn to tie topwater bluegill and bass bugs as well as nymphs and dry flies for trout fishing.

No training course would be complete without a discussion about fishing etiquette and catch and release fishing. The students are offered an easy formula for both of these ethical situations. The guiding rule for fishing ettiquette is the golden rule; "Do unto others as you would have them do unto you." To put it simply, step into a stream to fish only when you are as far from another angler as you would want

There is a lot more to fishing than catching fish, as a group of young people learn while visiting a stream.

him to stay away from you. Trout fishing is in some ways a sport that seeks solitude. It is sometimes called "the quiet sport." Good fishing etiquette provides for keeping that tone.

The other ethical consideration of "catch and release" is usually dealt with just as simply. Catch as many as you would like to eat, but release the wild trout back into the stream. If the trout are stocked and you wish to have some for dinner, that is why they were put there. Chances are the water they are stocked into would not hold them over the summer anyway, so it is fine to keep a few for supper. Lee Wulff, said it best, "A trout is too valuable to be caught only once."

Finally after learning so much about streams and fishing, its time to learn to cast and catch fish. The casting is learned first and separate from the fishing, mostly because it is hard to teach casting when the student is focused on catching a fish and not listening and learning about the subtle nuances of the casting stroke, line control, and precise placement of the fly. It is best to commit all of these things into motor memory before taking on the challenge of moving water on a trout stream.

Helping kids to have fun, learn to fish, and make new friends are just a few of the rewards for the hardworking volunteers of the Rapidan Chapter of Trout Unlimited. This year's Rapidan "Kid's Day" is scheduled for March 15th, near Graves Mountain Lodge, in Madison County.

The actual fishing begins on a pond. There are several reasons for choosing a pond first and that is the ease of finding an open place for back casting. It also allows for learning to cast a slack leader cast and a straight one. Roll casting is also best learned on water. Hooking the fish is a task that requires great finesse, as striking too hard will break the fish off and striking too soft will allow him to jerk free and swim away. So learning to hook, play, and land a fish are all learned on a pond.

The great finale finally comes in the form of fishing a wild trout stream somewhere in the Shenandoah National Park. This is where the great memories are made. The setting is perfect. A sunny, warm day, water cascading over rocks and boulders, and then the challenge of finding a way to place that fly in a small pool without a splash, mend the line to keep the fly from dragging, stripping line under your finger to keep slack from developing, and finally when you do it all correctly the reward is the strike of a hungry brook trout.

Your first trout, a wild, native brookie—this is what memories of a lifetime are made of. The colors of our native brookie are rivaled by few things in nature. The bright orange of the belly, the snow white edges on the fins, the little blue halos and bright spots leave one with the feeling that this watery world we have just learned so much about has yielded its most prized possession. Just snap a picture in your memory and store it there forever to be brought out and admired whenever you wish to recall your "First Trout" and those who taught you your "First Cast." □

Marcia Woolman is a freelance outdoor writer from Middleburg, Va. Marcia and husband Hank teach and guide fly-fishing in Va., Pa., and Yellowstone Park. More information is available at www.woolmancane.com or call 540-253-5545.

Journal

VDGIF 2003 Calendar of Events

February 12-14, 2003: *Ole' Timey Tanning Workshop.* Learn methods of leather & fur tanning using materials from the woods and home. Holiday Lake 4-H Educational Center, Appomattox. For information call 434-248-5444 or **www.ext.vt.educ/resources/4h/holiday/adultprograms.html**.

March 12-14, 2003: *Spring Pools Institute.* An advanced workshop on the ecology & conservation of vernal pools & isolated wetlands. Holiday Lake 4-H Educational Center, Appomattox. For information call 434-248-5444 or **www.ext.vt.educ/resources/4h/holiday/adultprograms.html**.

March 16-19, 2003: *Primitive Bow Workshop.* Make your own primitive bow from kit & instruction of long time bow makers. Holiday Lake 4-H Educational Center, Appomattox. For information call 434-248-5444 or **www.ext.vt.educ/resources/4h/holiday/adultprograms.html**. □

Answers to the December 2002 "Byrd Nest" Crossword Puzzle

We hope you had fun doing the December crossword puzzle. The following clue was inadvertently left off. Talk about being "out-foxed."

Across
31. Small furbearing animal. □

AROUND THE CAMPFIRE

by Jennifer Worrell

What's for Dessert?

Powhatan biologist Patty Moore regularly acquires unusual items in her line of work. At any given time, she may have deer antler sheds, turtle shells, and even a road-killed specimen that she feels may make a good mount for a future educational display.

One night, after storing her finds for the week, Patty had a dinner party for some family friends. When it came time for dessert, Patty served ice cream. One guest found the flavor so delicious that she headed to the kitchen for another scoop. As she opened the freezer, the unsuspecting woman screamed. Patty raced into the kitchen to help only to find her friend eye-to-eye with an enormous owl wedged in the freezer. Patty explained that she had found the unfortunate bird near the road and was preserving it for further analysis. Luckily the friend saw the humor in the situation, and the evening continued as planned. Owl Pops, anyone? □

BYRD NEST CROSSWORD

C	A	T	E	R	P	I	L	L	A	R
H	E	R		O	Y	S		A	M	E
E		A	I	D	E		I	B	I	D
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P			S	O		C		A	I	R
E	P	A			C	O	O	N		
A	L	L	A	Y		Y		K	T	T
K	E	E	L		S				R	R
E	A	S	T	E	R	N	G	R	A	Y

On The Water

by Jim Crosby

Something New About GPS

How about a satellite-based navigation system for your own personal use that can pinpoint an exact spot anywhere on earth within three feet? Beyond the purchase of a receiver, the system is entirely free. Originally developed and owned by the U.S. Department of Defense for military use, civilian use has grown, and continues to grow, as receivers become more readily available and modest in price. You can find them in the local department store for the price of a pair of binoculars.

Two recent events have served to increase the accuracy of GPS (Global Positioning System) for personal use. The first occurred when the President of the United States ordered the intentional degradation of the system by the Department of Defense on May 1, 2000. Of course, "selective availability" can be turned back on at anytime for national security reasons. The second is the establishment of the Wide Area Augmentation System (WAAS) that corrects GPS readings and substantially improves their performance. This improvement comes from a constellation of low-level satellites transmitting in the same frequency range as the standard GPS satellites to eliminate much of the interference caused by cloud cover, weather, and stray electrical fields. WAAS is now available on the newer receivers without additional cost.

These marvelous new units can be as small as a cell phone and are just made for people who enjoy the outdoors—boating, fishing, hiking, motoring, or flying. They can prevent you from getting lost on the water, in the woods, or anywhere on, or above, the earth.

With a GPS unit in your hand, you can take a walk in the woods without the fear of getting disoriented. Just mark your departure point with the press of a button, and when you are ready to return, push the return key and its tiny computer will show you the exact direction to return to your starting point, how far away it is and approximately when you will arrive there—constantly updated as you proceed.

Marking your location at the dock, you can take an extended trip on the water involving many course changes. Marking each one, the GPS will remember them, and upon your return, will offer direction and ETA for each until you tie-up back at your dock.

Units are available that even have a chart background which will show exactly where you are on that chart with a blinking dot of light. The only difference between them and radar is that they will not show you the presence of other watercraft. Combining the two is a navigator's dream.

This technology has even been developed for motor vehicle and aircraft navigation. When your unit receives data from four or more satellites, it will offer 3-dimensional navigation calculation of position, time, and height above sea level—an important element for aerial navigation.

The newest GPS receivers with their microcomputers can make travel much safer and virtually eliminate getting lost. Now is the time to give them a serious new look! □

RECIPES

by Joan Cone

A Winter Fish Dinner

Some scientists have said the pike family's wide distribution came about because they swam all around the North Pole in freshwater formed by melting glaciers. Whatever the reason, pike and their relatives are found throughout the northern hemisphere, and the further north you go, the better the fishing is for them. All pike family members have "y" bones like shad. These lie along the lateral line and can be removed with a sharp knife.

Menu

Curried Mushroom Soup
(For microwave)
Fish Pie With Biscuit Topping
Red Leaf Salad With Honey Vinaigrette
Cream Cheese Tortilla Blintzes

Curried Mushroom Soup (for microwave)

2 tablespoons butter or margarine
4 green onions with tops, chopped
¼ teaspoon curry powder
1 tablespoon flour
1 cup chicken broth
1 cup milk
6 ounces fresh mushrooms, chopped
Salt and pepper to taste
¼ cup half and half
1 egg yolk

Place butter in a deep 1½-quart casserole. Microwave on HIGH for 45 seconds or until butter melts. Stir in onions and curry powder. Microwave on HIGH for 1 minute or until onion is tender. Add flour, stirring until smooth. Gradually add broth and milk, stirring well. Microwave on HIGH for 4 minutes; stir well with a wire whisk. Add mushrooms, salt and pepper. Microwave on HIGH for 2 to 3 minutes or until slightly thickened. Combine half-and-half and egg yolk. Gradually add about ¼ of hot mixture to yolk mixture, stirring constantly and add to remaining hot mixture. Microwave on HIGH for 1½ minutes, stirring every 30 seconds until smooth and slightly thickened. Serve immediately. Makes about 2⅔ cups.

Fish Pie with Biscuit Topping

1 pound pike or pickerel fillets
1 package (10 ounces) frozen mixed vegetables, broken apart
1 can (10½ ounces) cream of celery soup
½ cup milk
½ teaspoon onion salt
1½ cups prepared biscuit mix
¾ cup shredded processed American cheese
½ cup milk

Thaw fish if frozen. Cut fillets into 1-inch pieces. In a 10-inch fry-pan, combine mixed vegetables, soup, ½ cup milk and onion salt; mix well. Cook over low heat about 5 minutes, stirring constantly. Add fish and heat thoroughly. Pour mixture into a well-greased 1½-quart baking dish. In a 1-quart mixing bowl, combine biscuit mix, cheese and ½ cup milk; stir to make a smooth dough. Drop biscuit mixture onto hot fish mixture. Bake in a preheated 400° F. oven for 18 to 20 minutes or until biscuits are done and brown. Makes 4 servings.

Red Leaf Salad with Honey Vinaigrette

4 cups torn red leaf lettuce
1 orange, peeled, halved lengthwise and sliced
1 apple, cored and cut into bite-size pieces
½ of a small cucumber, thinly sliced
3 tablespoons sugar
3 tablespoons white wine vinegar
2 tablespoons honey mustard

Divide lettuce among 4 salad plates. Top each serving with orange, apple, and cucumber. For dressing combine sugar, vinegar, and mustard in screw-top jar. Cover and shake well. Drizzle each salad with dressing. Serves 4.

Cream Cheese Tortilla Blintzes

½ cup dried currants
1½ tablespoons dark rum or brandy
5 ounces cream cheese, at room temperature
2 tablespoons red raspberry preserves
½ teaspoon cinnamon
½ cup chopped walnuts
6 (7 or 8-inch) thin flour tortillas
2 tablespoons butter, melted

Preheat oven to 425°F. In a small bowl, cover the currants with rum and let stand for 5 minutes, stirring twice. Meanwhile, in a food processor, purée the cream cheese with the red raspberry preserves and cinnamon. Scrape the cream cheese mixture into a medium bowl and stir in the walnuts and the currants with their soaking liquid.

Line a baking sheet with non-stick aluminum foil. Wrap the tortillas in a kitchen towel and heat in a microwave for 30 seconds. Place the tortillas on baking sheet and spoon ⅙ of the cream cheese filling just below the center of each one. Fold the left and right sides of the tortillas partially over the filling. Roll up the tortillas to form small burritos and hold together with a toothpick. Brush with the melted butter and bake for 5 minutes. Brush again with some butter and bake for 5 minutes longer, until golden. Remove from the oven and cool for 5 minutes. Transfer the blintzes to plates and serve at once with vanilla ice cream. □

Virginia's Finest

Naturally Wild

story and illustration
by Spike Knuth

Carolina Chickadee

Parus carolinensis

To the birdwatcher, hunter, homesteader, or woodsman, the little chickadee is synonymous with cheerfulness and motion. These little feathered dynamos are as bold as they are cheery. They'll come down close to a person in the woods or yard, flitting just out of reach, cocking their heads with sparkling little black eyes as if studying the intruder, uttering a challenging "chick-a-dee-dee-dee."

Even during the bleakest of winter days, the chickadee is restless and active, seemingly unconcerned about the cold and wind. To withstand the cold weather, the little chickadee must eat constantly. In the woods and hedgerows, chickadees roam about in family groups often accompanied by nuthatches, titmice, kinglets, brown creepers, downy woodpeckers, and occasionally yellow-rumped warblers, bluebirds, and red-bellied woodpeckers.

At this time they feed mainly on hibernating insects, insect pupae, and insect eggs which they find by diligently searching crevices in tree bark, branches, and twigs. Chickadees come regularly to backyard feeders supplied with sunflower seeds, especially the black oil-seed variety, as well as other smaller seeds and suet. They'll fly to the feeder, quickly grab a seed and fly off to a safe perch in a shrub or tree. Here they hold the seed with both feet and hammer it open with their bill to get at the seed meat. They'll make trip after trip, taking but a second or two to "grab-and-go."

There are two types of chickadees in Virginia. The black-capped chickadee is a more northerly species, but is found in the upper elevations of the Appalachians and other areas above 1,800 feet in winter, and 3,600 feet in summer. They measure about 5½ inches in length. They are larger-headed and longer-tailed than the Carolina chickadee. The smaller Carolinas measure up to 4¾ inches, and are more common, inhabiting the lower elevations over most of Virginia. Both utter the "chick-a-dee-dee-dee" call, but the Carolina's is higher-pitched and faster—almost scratchy at times. The black cap also has a slower, softer "dee-dee" call.

About March or April, the roving bands of chickadees begin dispersing into pairs and start searching for nesting sites. Where their ranges overlap they may hybridize. Both species have similar nesting habitats. They choose cavities in rotten tree stumps, snags, or fence posts, and do much of the excavating themselves if the wood is soft. Occasionally they'll use an old woodpecker hole or enlarge a feeding hole that a woodpecker had started. Six to eight eggs are laid, but a clutch of 10 is not unusual. The white eggs are lightly speckled with brown. They hatch in about 14 days, and after another 16 days the young are fledged. Food-getting for the unusually large brood makes life busy for the parent birds. By the end of summer, the young are independent and soon they again gather in family groups to roam the woodlands, swamps, hedgerows, and backyards to delight us with their cheery, inquisitive boldness. □

Wild Backyard

story and photos by Marlene A. Condon

Grow a Meadow Instead of a Lawn

Weed ordinances can limit gardening for wildlife in cities and subdivisions. Worse yet, when people move to the country, they often bring self-imposed weed ordinances with them—growing large lawns instead of meadows. Luckily, some people do choose to live in harmony with the natural world, setting a fine example for others to follow.

Michael Yuhasz and his family live in a house that was built in a field in Albemarle County, Virginia. Michael mows only the immediate yard around his house, letting the rest of the property grow wild. Filled with wildflowers from spring through fall, his property is pretty to look at and useful to wildlife—sustaining insects, reptiles, small mammals, and birds. By allowing the plants to go to seed and leaving them standing until spring, Michael provides food and shelter for wildlife throughout the cold months of the year and the area is automatically reseeded with annual flowers that might otherwise disappear.

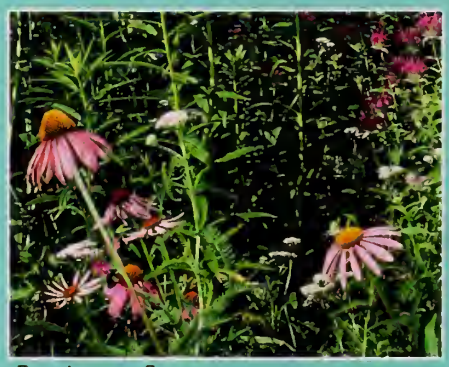
Melanie and Bruce Snyder are Albemarle County residents with a small area of grass immediately in front of their home. But beyond lies a two-acre meadow that is a mass of beautiful flowers and wild grasses from late spring into fall. The beautiful songs of the eastern meadowlark and bobwhite quail can be heard on this property.

Eastern meadowlarks are representative of a number of grassland birds that are disappearing from our environment because there are so few uncut fields anymore. The northern bobwhite and the American woodcock are two other species in serious decline because of this loss of habitat. These birds (as well as many other kinds of animals) nest among tall grasses and wildflowers. They need large areas of tall plant growth to hide their nests from predators, as well as to hide themselves when they are searching for insects, seeds, or fruit. Since very few people allow their fields to remain uncut through the growing season, grassland birds are not able to successfully reproduce and they are disappearing from our lives.

We need more folks willing to help our wildlife by resisting the urge to cultivate large lawns around their homes. Allow a lovely meadow to grow if you want to really help our wildlife. ☐

Shasta daisies make more of an impact than the native oxeye daisies and may be easier to obtain.

This meadow with nearby cedar woods supports northern bobwhite quail *(Colinus virginianus)* and eastern meadowlarks *(Sturnella magna)*.



Purple coneflower, common yarrow, and wild bergamot are great plants for a meadow. They will come back year after year and spread if you let them.

Maintaining a small lawn close to the house while allowing most of your property to grow tall for wildlife has many benefits, besides the obvious one of not having to waste your life mowing a lot of land.

Virginia Wildlife 2003 Annual Photography Contest

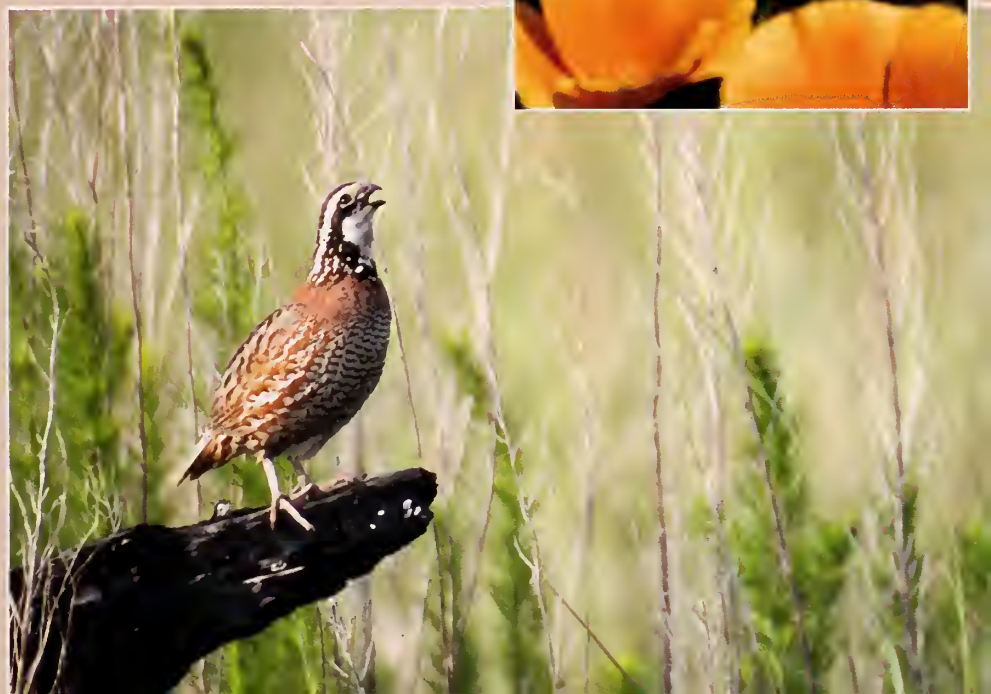
This year's photography contest is going to be bigger than ever. Special prizes donated by Eastman Kodak, Richmond Camera, and *Virginia Wildlife* will be given to contest winners. And, one very talented contest winner will have their photograph featured on the cover of *Virginia Wildlife* magazine as the Grand Prize.

This year's contest has been expanded to eight categories.

1. *Birds of a Feather*
2. *Cold and Clammy Critters* (reptiles and amphibians)
3. *A Bugs Life*
4. *Fantastic Flowers*
5. *Marvelous Mammals*
6. *Scenic Seasons*: is a category that will highlight the four seasons; Winter, Spring, Summer, and Fall.
7. *The Sporting Life*: pictures should feature hunting, fishing, boating, and other outdoor recreational opportunities in Virginia. Please make sure that all activities are done in a SAFE manner (lifejackets, blaze orange, eye and hearing protection...when appropriate).
8. *Kids and Cameras*: is a two part category that encourages kids ages 6-12 and 13-18 to enter any of the above categories. There will be one winner from each age group and category.

First place winners in each category will receive prizes donated by the Eastman Kodak Company; second place winners will receive prizes from Richmond Camera; third place winners will receive an official *Virginia Wildlife* cap, and honorable mention winners will receive a pocket photography guide book. On top of that, winners will have their photographs published in the first ever *Special Virginia Wildlife Outdoor Photography* issue, premiering March 2004.

For additional information and contest rules send a self addressed, stamped envelope with 37 cents postage to: *Virginia Wildlife* Photography Contest, 4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104 or visit our Web site at www.dgif.state.va.us. Deadline for contest submissions is December 1, 2003. Good luck, good shooting, and have fun!



HOO Likes Tax Time!

Well, the great horned owl for one. For Virginia's native birds, fish, and other nongame animals tax time means an opportunity for you to support Virginia's Nongame Wildlife Program.

If you are due a tax refund from the Commonwealth of Virginia, you can take advantage of this opportunity to contribute to nongame wildlife management and conservation by simply marking your 2002 state tax return in the appropriate place. Most of the funds for Virginia's Nongame Wildlife Program are generated by donations and the tax checkoff on the Virginia State Income Tax Form.

Please remember the Virginia Nongame Wildlife Tax Checkoff this year or send your tax-deductible check, (made payable to the Treasurer of Virginia), to: Virginia Nongame Wildlife Fund, Virginia Department of Game and Inland Fisheries, P. O. Box 11104, Richmond, VA 23230-1104

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